# Benchmarks in the FEMC

Sebouh Paul
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# Changes made

- EICrecon:
  - Increased threshold for the energy of a central hit from 10 MeV to 60 MeV
    - Merged in https://github.com/eic/EICrecon/pull/1613/
  - Enabled splitting of clusters
    - Open pull request https://github.com/eic/EICrecon/pull/1625
- Detector_benchmarks:
  - Added benchmarks for electrons, photons and pi0s.
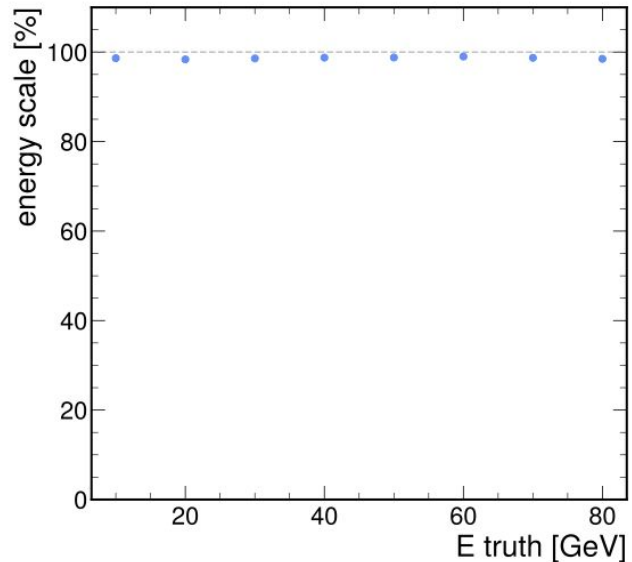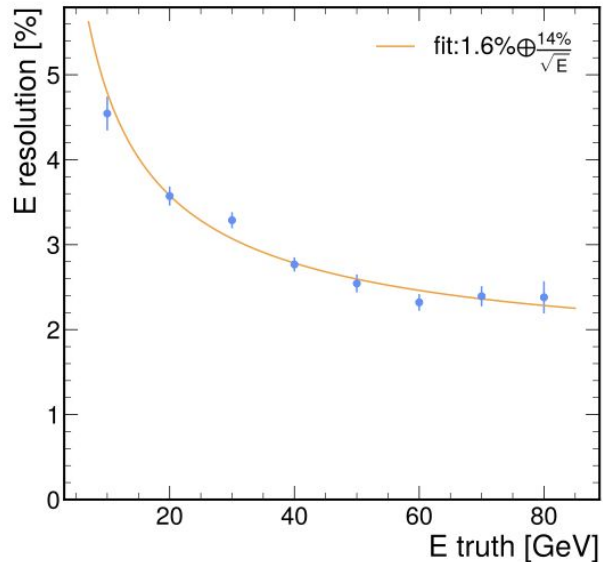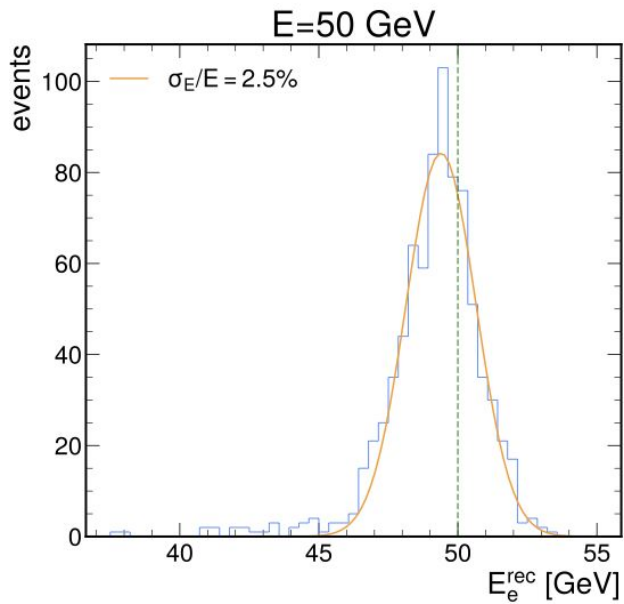   - Open pull request: https://github.com/eic/detector_benchmarks/pull/75
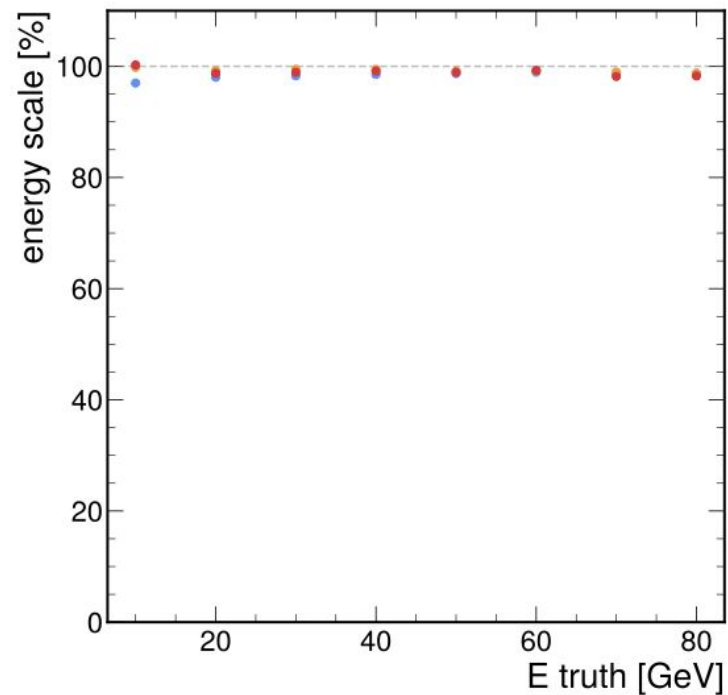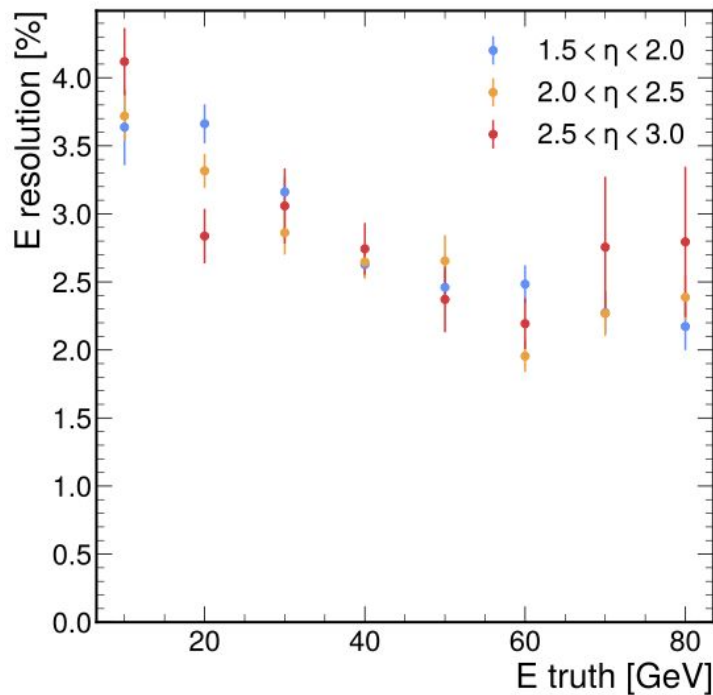
Electron
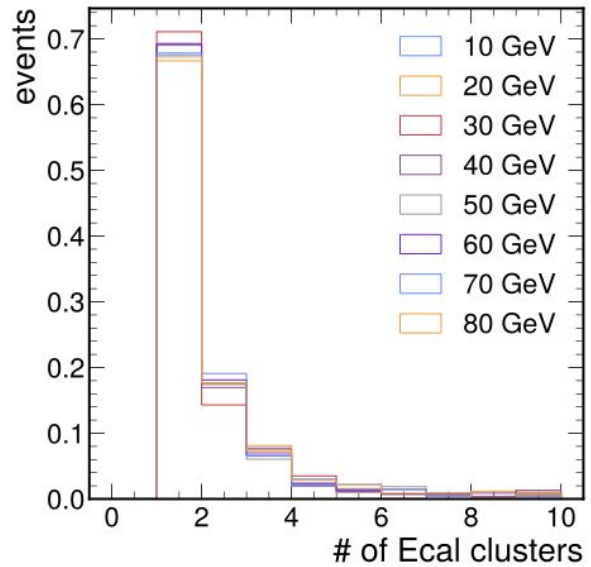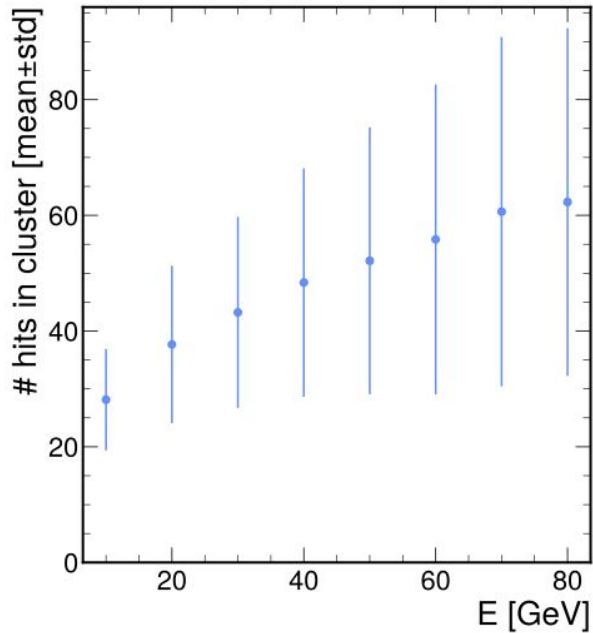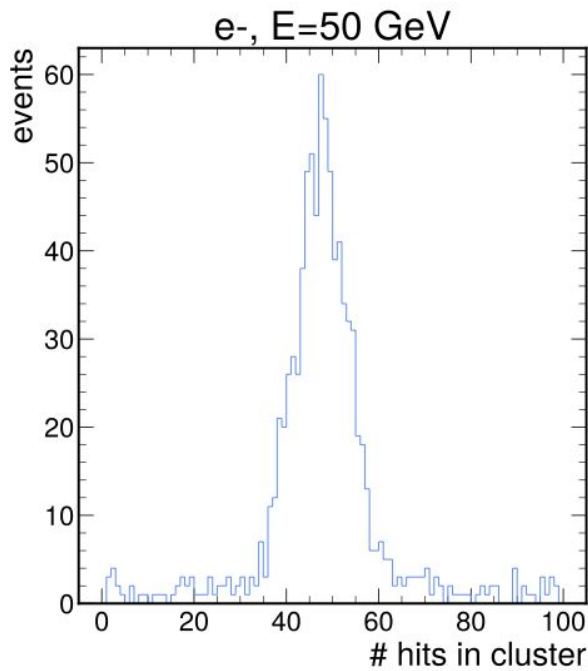
Electron examples

e^-, 50 GeV

e-, 50 GeV
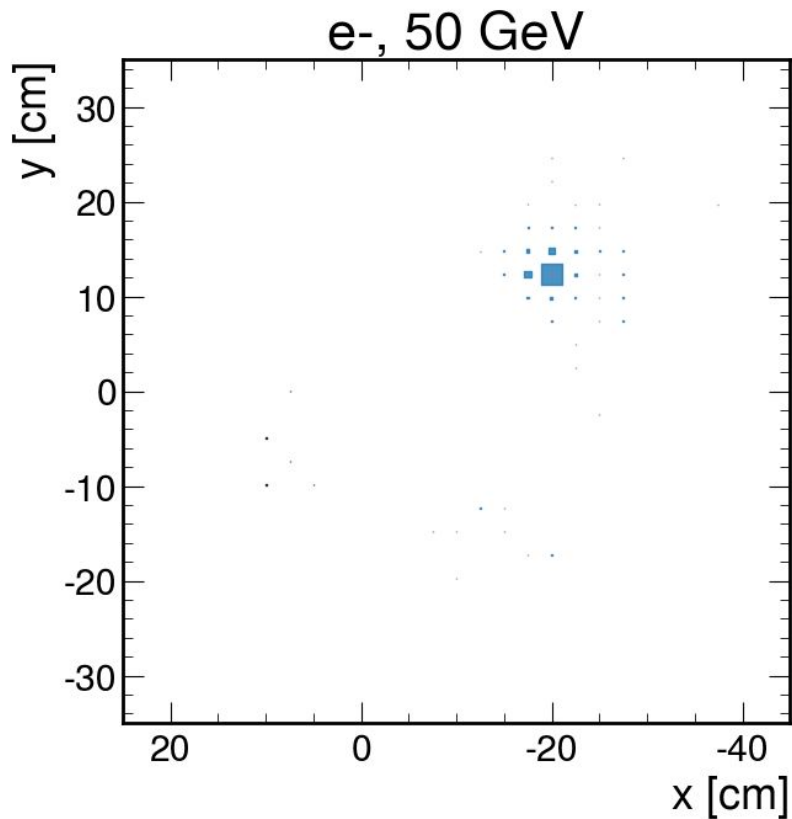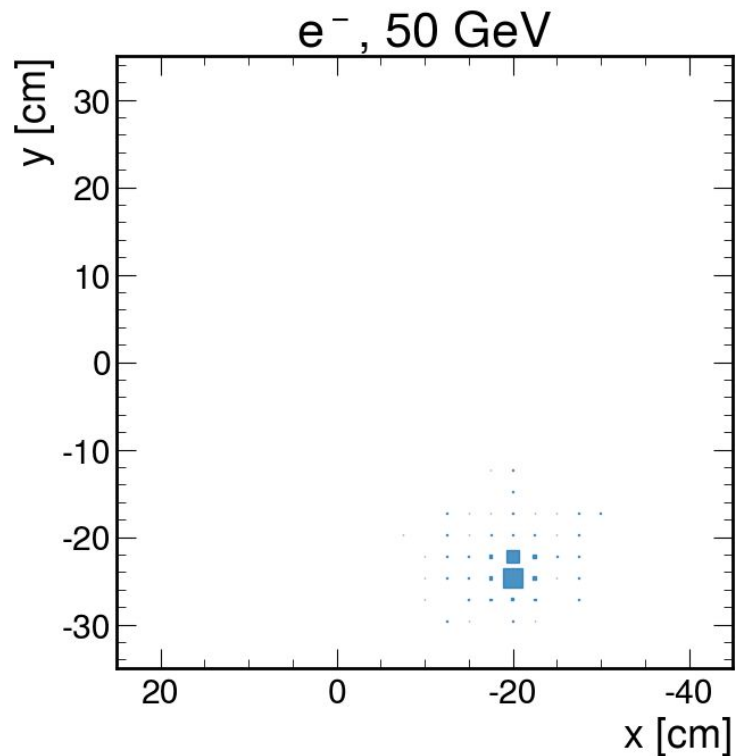
Electron energy recon

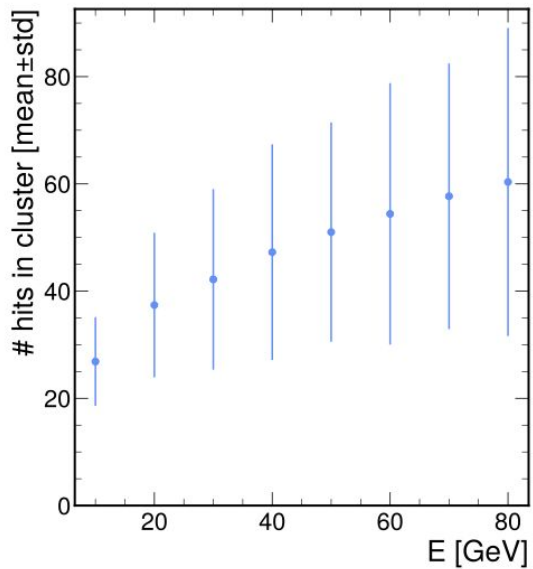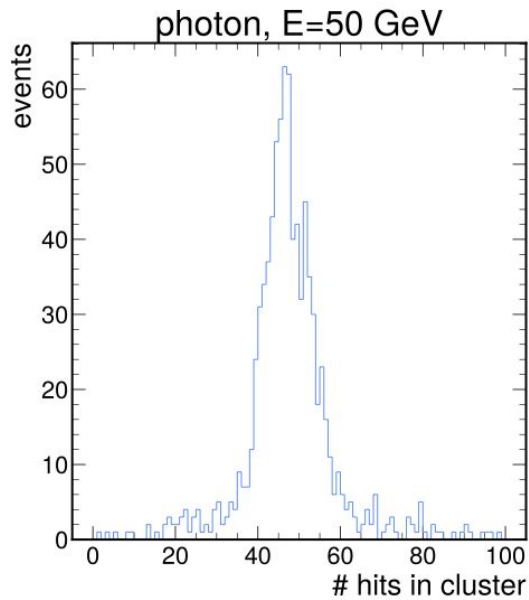# Eta dependence
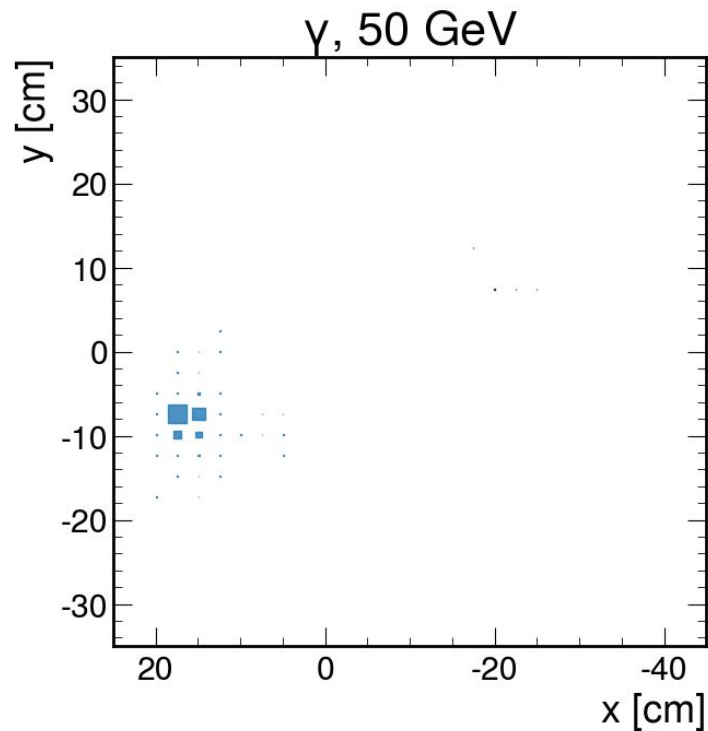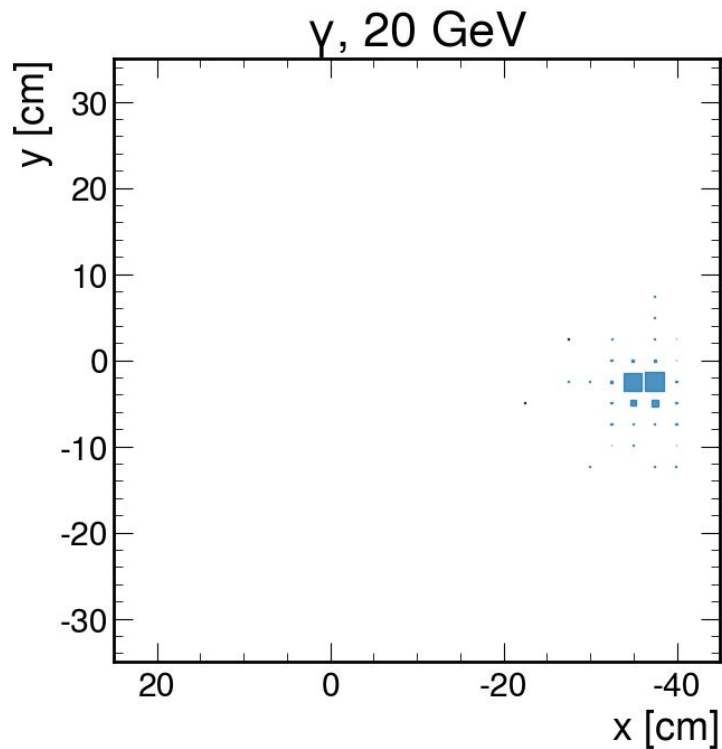
*Note: this will be expanded to η=~4.0 once the geometry model is updated to use a single collection for all FEMC hits, and not split them between the main part and the part covering the same area as the insert.
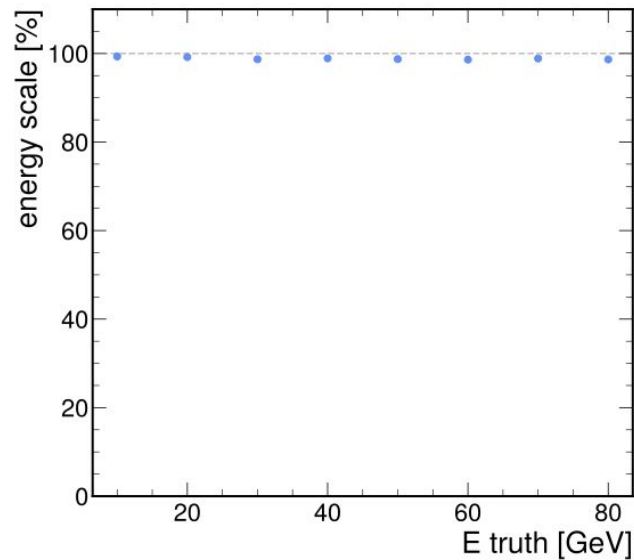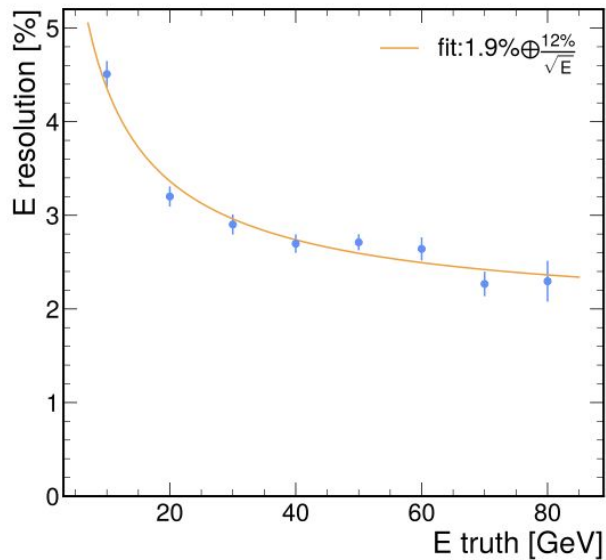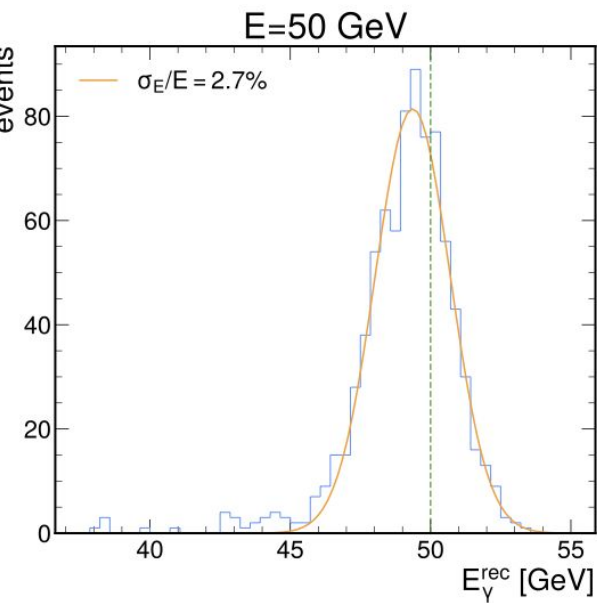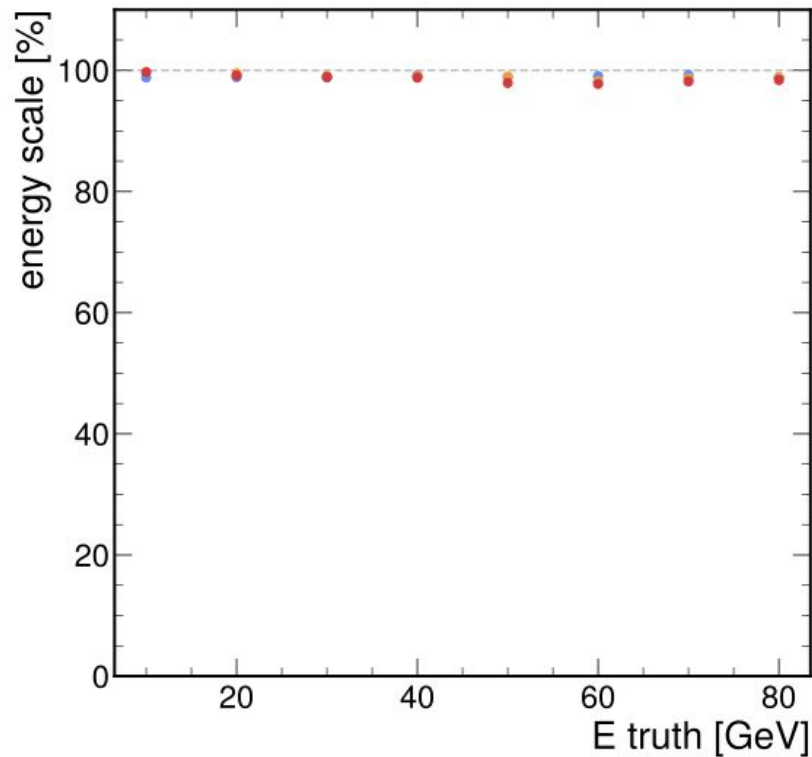
Photon
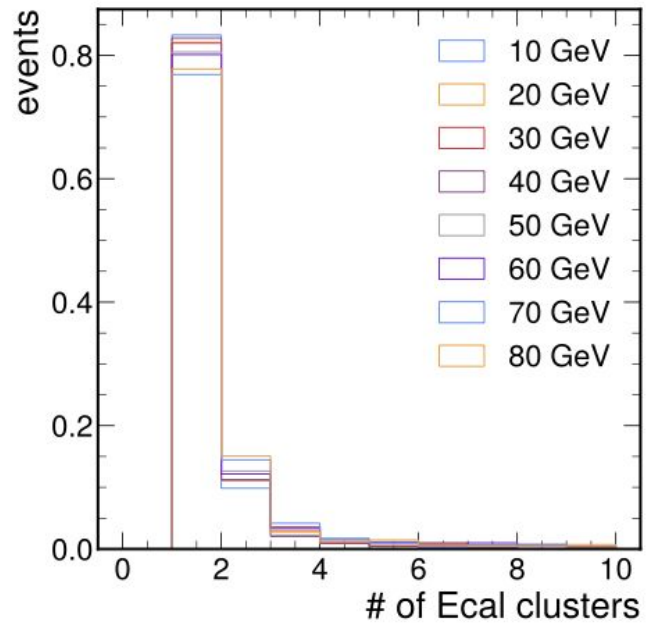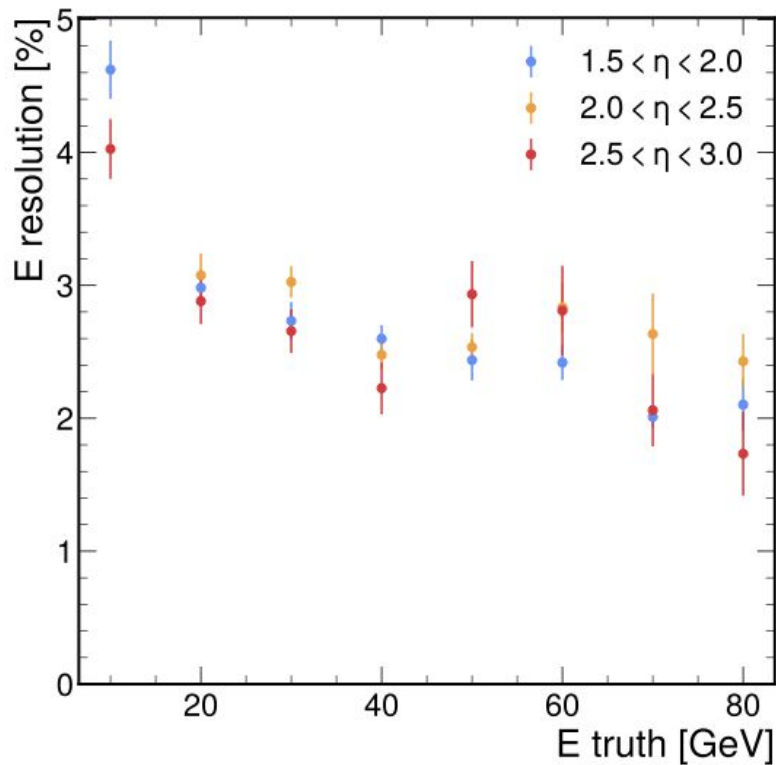
Some photon events

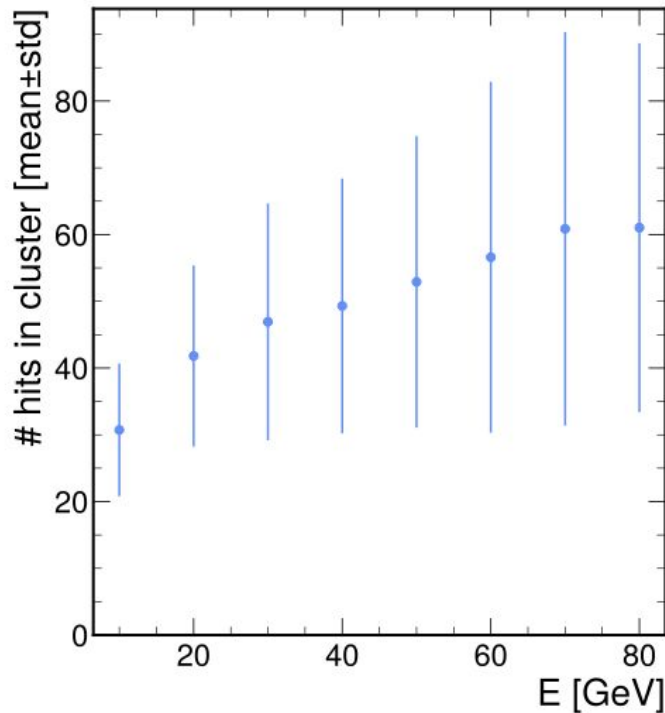# Photon energy reconstruction

Similar results to that of the electron

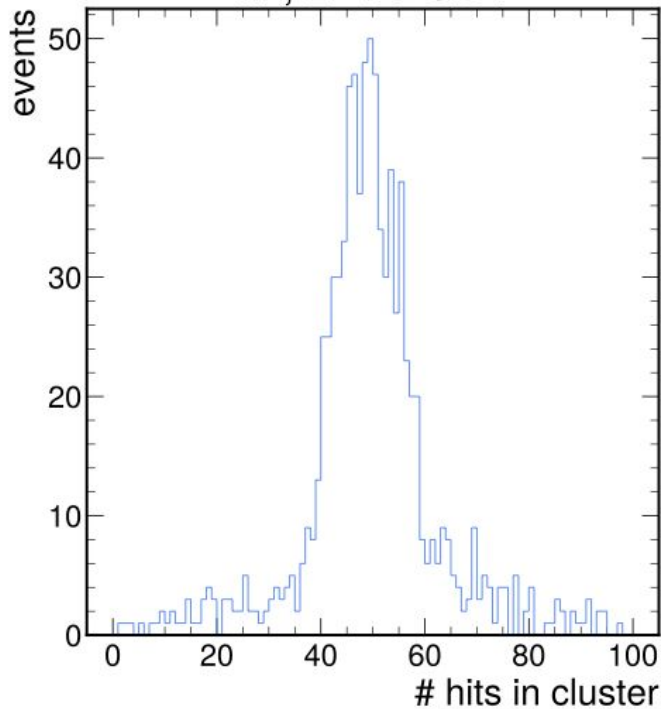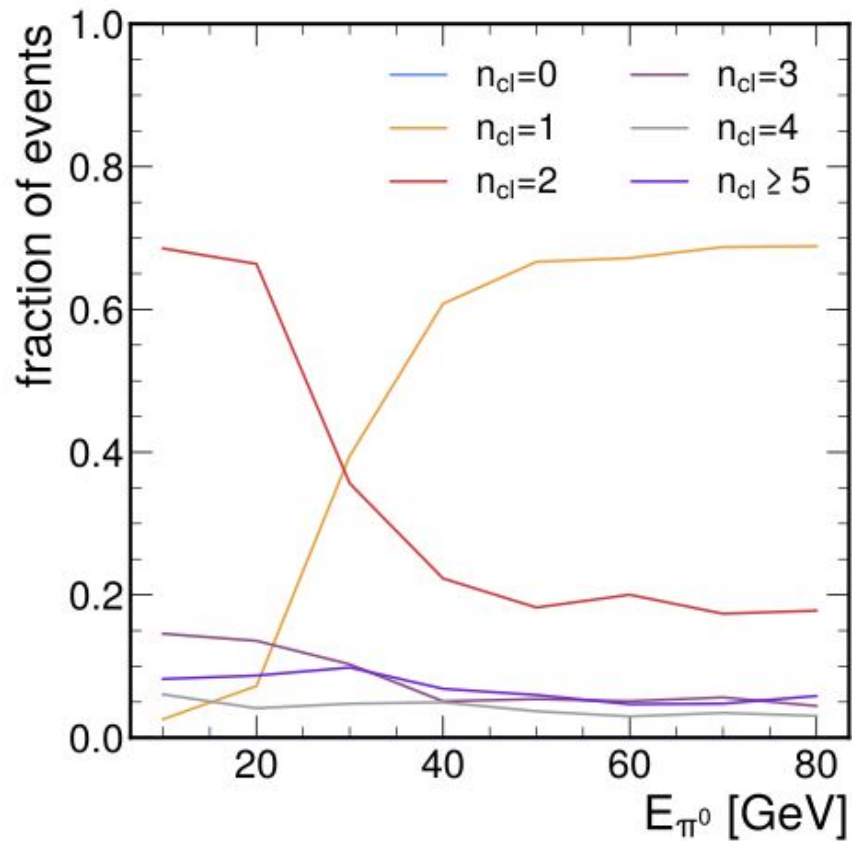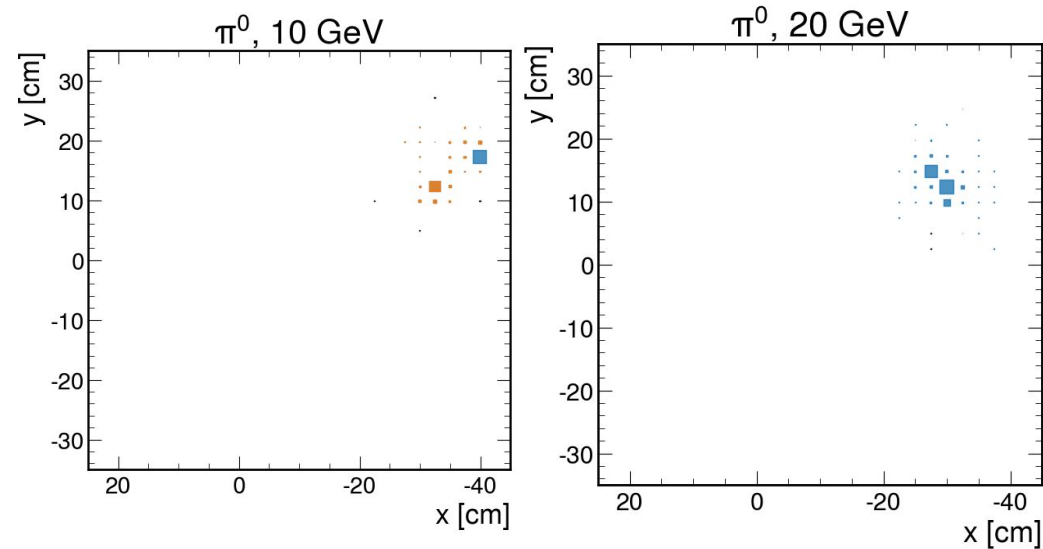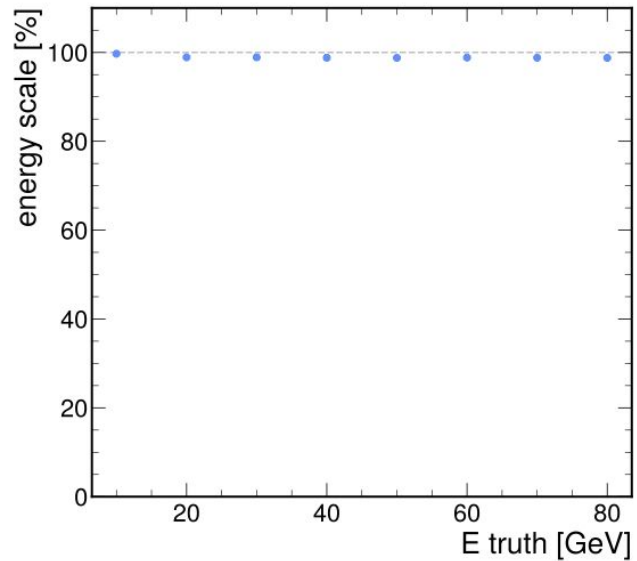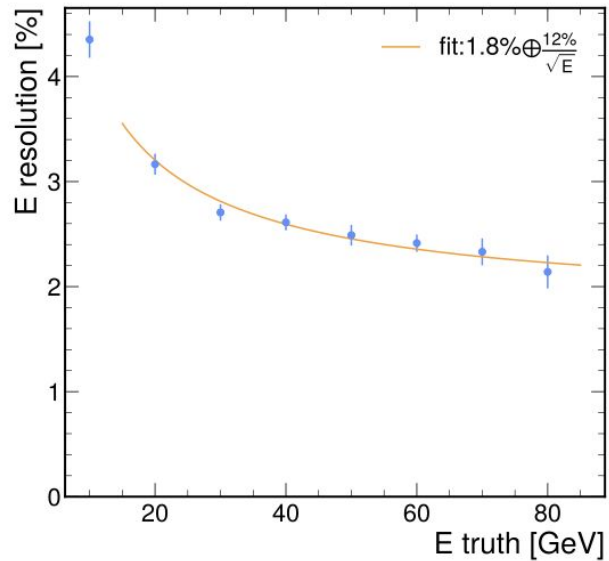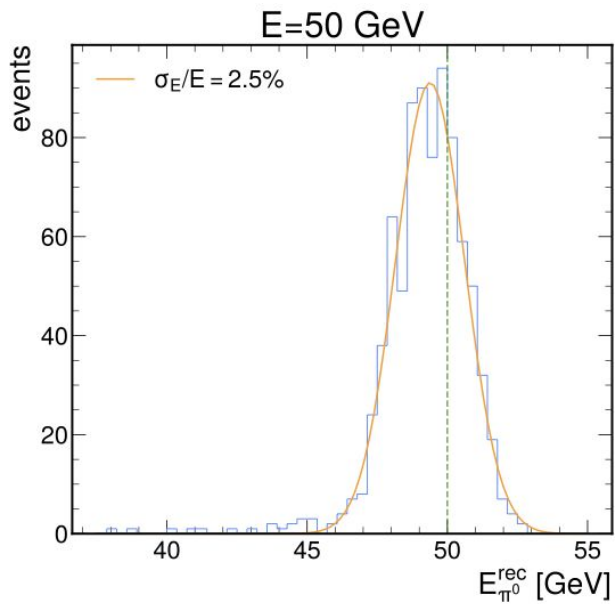# Photon: Eta dependence

π⁰ benchmark

*highest energy cluster

π⁰: number of clusters

- At E>20 GeV, it becomes more difficult to distinguish a pi0 from a single photon

π⁰, 10 GeV

π⁰, 20 GeV

π⁰: Energy resolution

π⁰: Eta dependence
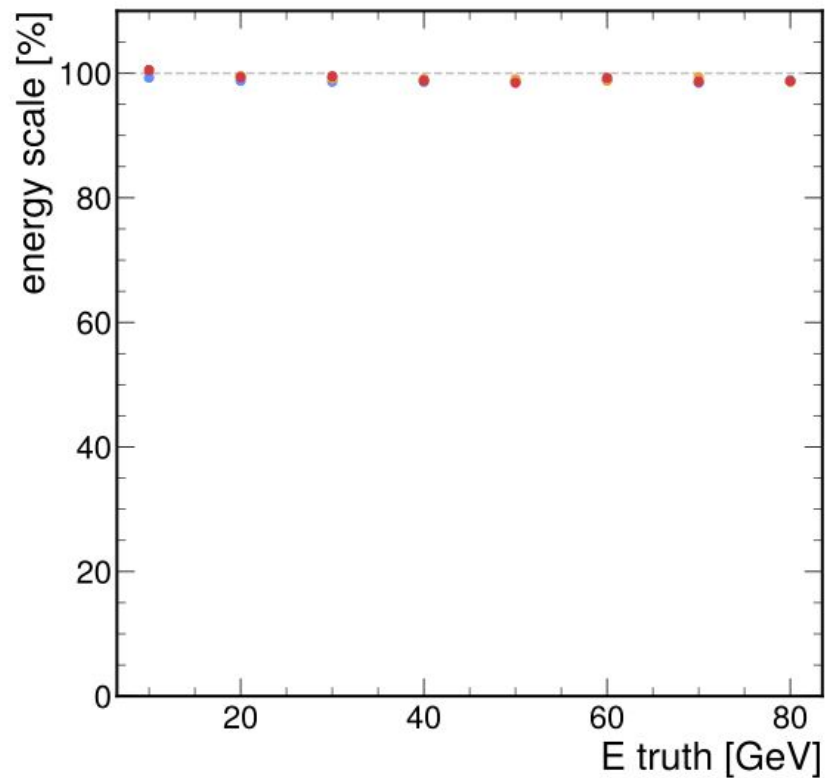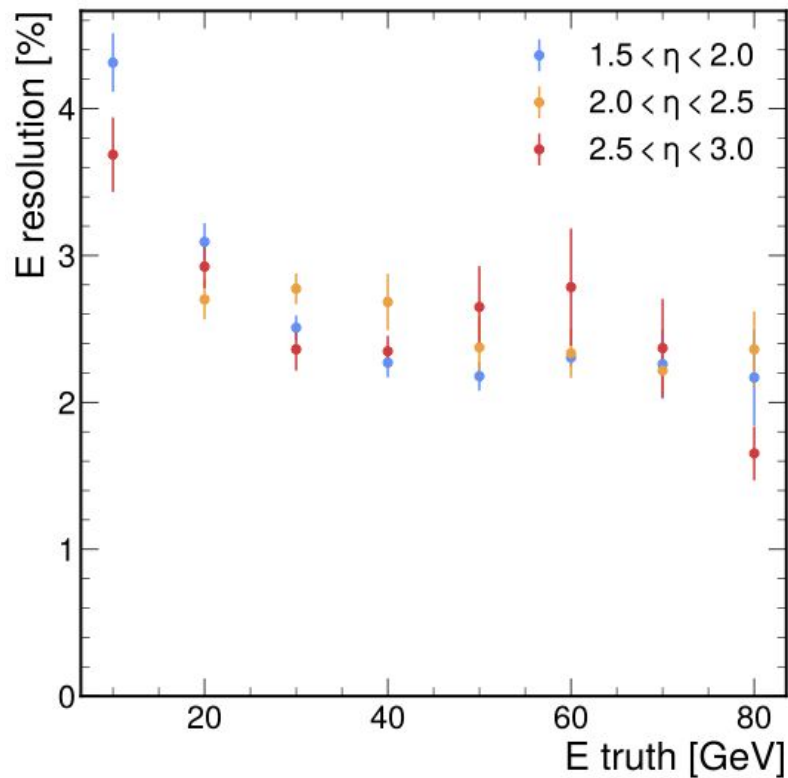
Conclusions

- Benchmarks have been added for the FEMC for e^-, γ, and π^0
- Energy resolution is ~14%/sqrt(E) oplus 2%
- Cluster count:
  - Electrons and photons: ~1 cluster
  - π^0: ~2 clusters at E≤20 GeV, ~1 cluster at higher energy